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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/611,862	07/03/2003	Tomio Iwasaki	500.39912CX1	3833

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EXAMINER

SMOOT, STEPHEN W

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 03/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/611,862	Applicant(s) IWASAKI ET AL.	
	Examiner Stephen W. Smoot	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2003 and 14 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-19 and 22 is/are rejected.
- 7) ☒ Claim(s) 20, 21, 23 and 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/787,528.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7-3-2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office action is in response to application papers filed on 03 July 2003. The preliminary amendments filed on 03 July 2003 and on 14 October 2003 have both been entered.

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

2. The disclosure is objected to because of the following informality:

Update the first sentence of the specification to indicate that US Application Serial No. 09/787,528 is now US Patent No. 6,624,513.

Appropriate correction is required.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the

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unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 13-18 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 3 of U.S. Patent No. 6,624,513 in view of Bronner et al.

Claim 3 of U.S. Patent No. 6,624,513 is directed to a multilayer film formed on a side of a semiconductor substrate that comprises a copper or copper alloy film in contact with a conductive film that comprises rhodium, ruthenium, iridium, osmium, or platinum as a main constituent and palladium, cobalt, nickel, or titanium with a concentration ranging from 0.14 to 25 atom % as an additional constituent. These are limitations set forth in claims 13-18 of the applicant's invention.

However, claim 3 of U.S. Patent No. 6,624,513 lacks the limitations of using the multilayer film as a plug for electrically connecting a diffusion layer to a connection layer disposed above the gate electrode through an insulating layer, the diffusion layer being within a semiconductor substrate and corresponding to a gate electrode, which are limitations of claim 13 of the applicant's invention. Further, claim 3 of U.S. Patent No.

6,624,513 lacks the limitations of using the multilayer film as a connection layer disposed above the gate electrode through an insulating layer and a plug for electrically connecting a diffusion layer to the connection layer, the diffusion layer being within a semiconductor substrate and corresponding to a gate electrode, which are limitations of claim 16 of the applicant's invention.

Bronner et al. teach a diffusion region (75) formed in a silicon substrate (50) that is adjacent to a gate stack (65) with a metal contact (90) formed through an insulator (85) to electrically connect the diffusion region (75) to an overlying metal line (100) (see Fig. 3 and column 3, line 7 to column 4, line 56). The metal can be a copper alloy (see column 4, lines 46-48).

It would have been obvious to use the multilayer film as claimed in claim 3 of U.S. Patent No. 6,624,513 as either the metal contact (90) or the metal line (100) of Bronner et al. in order to operate the field effect transistors taught by Bronner et al. by making electrical contact thereto.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 13, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schacham-Diamand et al. in view of Bronner et al.

Referring to Fig. 7, Schacham-Diamand et al. disclose a copper plug (23) that is adjacent to a catalytic seed layer (18) that can be platinum or rhodium (also see column 6, lines 13-18, 45-56 and column 7, lines 29-35). Referring to Fig. 13, Schacham-Diamand et al. disclose copper lines (33) that are adjacent to catalytic seed layers (18a) that can be platinum or rhodium (also see column 9, lines 12-40). Schacham-Diamand et al. further disclose that the catalytic seed layers can be used to line copper-filled contact openings for connecting to doped contact regions (i.e. a diffusion region) (see column 10, lines 54-63). These are limitation set forth in claims 13, 16 of the applicant's invention.

However, although Schacham-Diamand et al. suggest forming the contact between the diffusion region and an overlying copper line, they do not expressly teach or suggest that the diffusion region has a corresponding gate electrode, which is a limitation of claims 13, 16.

Bronner et al. teach a diffusion region (75) formed in a silicon substrate (50) that is adjacent to a gate stack (65) with a metal contact (90) formed through an insulator (85) to electrically connect the diffusion region (75) to an overlying metal line (100) (see Fig. 3 and column 3, line 7 to column 4, line 56). The metal can be a copper alloy (see column 4, lines 46-48).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Schacham-Diamand et al. and

Bronner et al. in order to form a copper connection to a diffusion region that corresponds to a gate stack as taught by Bronner et al. Bronner et al. recognize that gate stacks when combined with adjacent diffusion regions can be used to construct field effect transistors (see column 3, lines 7-12).

7. Claims 19, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bronner et al. in view of Psaras et al.

Referring to Fig. 3 and column 3, line 7 to column 4, line 56, Bronner et al. teach a diffusion region (70) formed in a silicon substrate (50) that is adjacent to a gate stack (60) with a metal contact (110) formed through an insulator (85) to electrically connect the gate stack (60) to an overlying metal line (100). The gate stacks have a polysilicon or silicide electrode. The metal can be a copper alloy (see column 4, lines 46-48). These are limitations set forth in claims 19, 22 of the applicant's invention.

However, Bronner et al. do not teach or suggest a gate electrode with rhodium, ruthenium, iridium, osmium or platinum as a main constituent (a limitation of claim 19), nor do they teach or suggest a multilayered gate electrode with a first conductive film that includes silicon and with a second conductive film, nearer to the plug, that includes rhodium, ruthenium, iridium, osmium or platinum as a main constituent (limitations of claim 22).

Psaras et al. teach a gate electrode comprising a lower layer of polysilicon (26) and an upper layer of Rh_2Si (i.e. an upper layer with rhodium as a main constituent) (see Fig. 5 and column 12, lines 9-47). Therefore it would have been obvious to a

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person of ordinary skill in the art at the time the invention was made to combine the teachings of Bronner et al. and Psaras et al. in order to use a polysilicon/Rh₂Si gate electrode as taught by Psaras et al. Psaras et al. recognize that silicides like Rh₂Si can be used in gate electrodes for making ohmic contacts (see column 1, lines 20-22 and column 10, lines 32-42).

Allowable Subject Matter

8. Claims 20-21, 23-24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not teach or suggest, in combination with the other claim limitations, a gate electrode that includes a conductive film that comprises rhodium, ruthenium, iridium, osmium, or platinum as a main constituent and palladium, cobalt, nickel, or titanium as an additional constituent.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00am to 4:30pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS

Stephen W. Smoot
Patent Examiner
Art Unit 2813